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SMALL FARMS IN THE CORN BELT.

BY

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U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT INDUSTRY,
OFFICE OF THE CHIEF,
Washington, D. C., March 4, 1908.

SIR: I have the honor to transmit herewith a paper entitled "Small Farms in the Corn Belt," by J. A. Warren, Scientific Assistant, prepared under the direction of the Agriculturist in Charge of Farm Management Investigations, and recommend that it be published as a Farmers' Bulletin.

In this bulletin an effort has been made to show some of the serious difficulties that confront a farmer of moderate means, to give some of the reasons for the alarming rapidity with which young men are flocking to the cities, and to show by actual records how some have solved the problems which all are facing.

Each of the farms here described has been visited in at least two different years and all the data have been obtained from the owners and are believed to be perfectly reliable. A number of such farms representing several other States which would have served as well for illustration have been studied, but the records were too meager to show what had been done.

The conditions here considered are much the same over most of the corn belt. The points brought out in the discussion are the results of several years of study along these lines and many years of experience in that region.

Respectfully,

B. T. GALLOWAY,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

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SMALL FARMS IN THE CORN BELT.

INTRODUCTION.

In the great corn belt, or at least that portion of it comprised in Indiana, Illinois, Iowa, northern Missouri, eastern Kansas, eastern Nebraska, southeastern South Dakota, and southern Minnesota, the majority of the farms contain 160 to 320 acres. Farms of only 80 acres are comparatively scarce, and not many farmers consider less than 160 acres sufficient to furnish a respectable living. Yet no careful observer can travel this region without being convinced that many a man would have a larger net profit and an easier and happier life if he farmed less extensively and more intensively. Good farms in this section are worth $50 to $200 an acre, or $8,000 to $32,000 for 160 acres. To this must be added $2,000 to $3,000 for teams, stock, machinery, feed, and seed, making a total investment of $10,000 to $35,000. How can the young man who has nothing to start on secure such a place? This is the problem that now confronts the majority of young farmers.

Ten to fifteen years ago many men with little or nothing to pay down bought farms and have since paid for them, but they bought at a fraction of the present prices. Take the moderate price of $75 an acre, or $12,000 for 160 acres, and add $2,000 for equipment, making a total of $14,000. The interest on $14,000 at 5 per cent, which is the lowest rate obtainable, amounts to $700 per annum. To expect to clear this each year after paying running expenses and a living and have money left to pay on the principal requires more confidence than the average man possesses. Even if he takes the risk and wins, the chances are few that he will be able to pay his debts and have his home clear by the time he is old enough to need to be relieved from hard labor. If he is to remain on the farm, only two propositions remain open to him. He can rent, with small chance of ever owning, a farm or he can go elsewhere in search of cheaper land, neither of which courses is very inviting. The large amount of money necessary for the purchase of a farm and the dim prospect of ever obtaining it discourage the farm boy, and as a result he begins, although reluc-

tantly perhaps, to look for other employment, while the young men who are not farmers see no opportunities for them in rural life.

Farm wages seem small when compared with wages and salaries offered for other work, but as a matter of fact they compare very favorably when rightly considered. The farm boy, or even the farmer of mature years, has little conception of the cost of living in cities. In his experience most of the living has come from the farm and he has not realized that it cost anything. Thirty dollars a month with board and washing is common wages for any good hand in most of this region, and many can command more. A single man can save as much out of $30 on the farm as out of $55 or $60 in the city. A married man can usually secure $35 or $40 a month, a house, garden, milk, fuel, a chance to keep poultry, and often feed for a pig. This is much more to him than $60 a month or $2.50 a day in town.

The hours required on the farm are not very much longer than in other occupations. The farmer is inclined to say he works sixteen hours a day if he rises at 5 o'clock and retires at 9, but in most cases, after counting out meals and rest periods, it is found he has not actually been at work more than eleven or twelve hours. In winter the hours are nearly always much shorter, and at all times of the year there are stormy days when little work is done. In town a man working a team must work ten hours and take care of his team and go to and from work outside of that, so his ten hours is of about the same length on the average as the farmer's sixteen. For the man who works without a team the hours are not much shorter when the time required in getting ready and going to work and in getting home again are considered, and if he is in one of the larger cities 10 cents a day must be expended for street car fare.

These unconsidered points, it seems to the writer, constitute the main reasons for the increasing and deplorable migration of young men from the farms to the cities, about which so much is being said and written.

Can not the young man rent a farm or work for wages a few years until he gets several hundred dollars ahead and then buy a small tract—20 or 40 acres—upon which to make a comfortable home of his own and have it free from incumbrance while there are still many years of active life before him?

In this connection it may be interesting to see what is being done on a few small farms. It is not presumed or even hoped that anyone will copy exactly any of the farms here discussed, and it is highly probable that failure would result if he did. The personal factor is very important and no one should attempt to follow another's plans in every detail. Each man should follow the line in which he is most likely to succeed and use all his own originality as well as adopt the

best practices of others. Then, again, varying conditions make one type of farm most profitable in one locality and another type in another locality, thus making a careful study of markets, soils, and climate indispensable. But there are hundreds of ways in which success may be attained on a small farm.

This bulletin aims to show how some practical men have solved the problem of securing homes on high-priced land, and if it suggests a way to others with limited means its purpose will be well served. It is true that two of the men whose farms are here described secured their land at a low figure, but their results show that they would have succeeded had they purchased high-priced land. No two of these farms are within 100 miles of each other—one is near a town of 2,500 inhabitants, one is 7 miles from such a town, and one is 10 miles from a town of 8,000 people.

The discussion of farms near the larger cities has purposely been avoided, as has that of dairy farms, because (1) cities as a rule are far apart and there is room for comparatively few farmers near them, (2) land is very high in the vicinity of cities, and (3) there is a mistaken idea that when located near a city the small farmer must be a market gardener or a dairyman, and there is a common prejudice against both of these types of farming.

All of the farms here described are found in a single State, but the conditions in all the States of the corn belt are so similar that if the localities were not mentioned no one could tell in which State they were to be found. Every statement applies with equal force to nearly all the region mentioned.

A FORTY-ACRE FARM IN SAUNDERS COUNTY, NEBRASKA.

DESCRIPTION.

Mr. C. E. Beadle owns and operates 40 acres of gently rolling upland prairie, much of it nearly level, in Saunders County, east-central Nebraska. The soil is a deep, dark silt loam characteristic of that region. The house, which is worth about $2,000, stands near the highway and is surrounded by a well-kept lawn bountifully supplied with trees and ornamental shrubbery. The farm buildings are not of special interest, because they were mostly on the farm when the present owner purchased it and are not such as he would have built.

In figure 1 is shown a diagram of this farm as it appeared in 1907.

CROPPING SYSTEM.

The cropping system followed is very simple, consisting of potatoes two or three years and mixed hay two or three years. In 1906 there were 14 acres in potatoes, 7 acres in hay, 11 acres in pasture, 1½ acres

in sweet corn to supplement the pasture (but this was not needed), 5½ acres in garden, orchard, and grounds, and 1 acre in a public road. In 1907 there were 7 acres of grass on the land that was in potatoes the previous year. Otherwise no changes were made. Hay enough for home use is produced, but all grain is purchased.

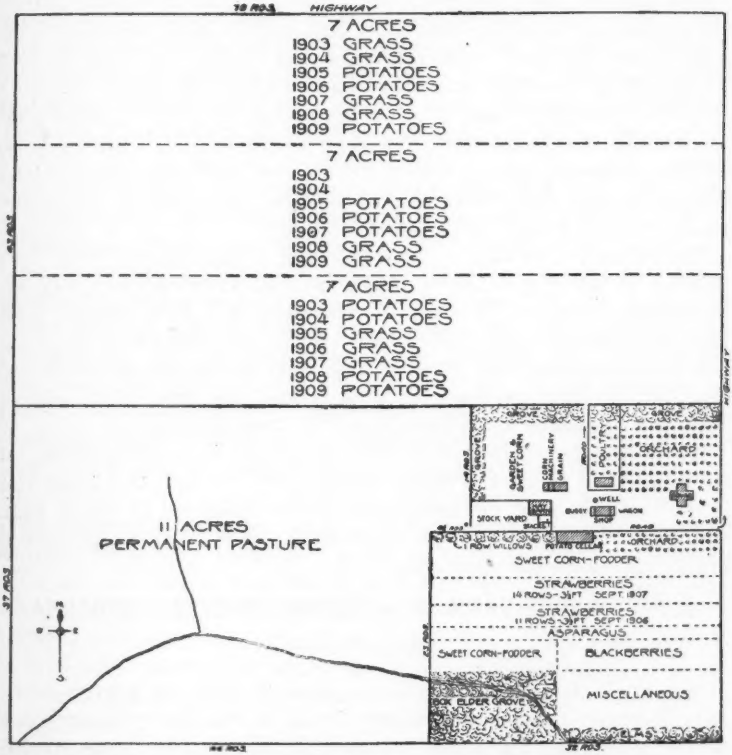

FIG. 1.—Diagram of the Beadle farm as it appeared in 1907.

POTATOES.

Seed Tubers.

Mr. Beadle plants nothing but northern seed potatoes and estimates that these yield 50 bushels to the acre more than if seed only one year removed from the North were used, while a better grade of potatoes is produced. Early Ohio and White Ohio are the varieties selected, the seed being grown at Fargo, N. Dak. The tubers are cut by hand to one or two eyes. Emphasis is placed upon the superior value of the first sprout from an eye, as this sprout comes from the main or

central bud and is larger and stronger than the sprouts that come later. Then, too, in potatoes that have sprouted the plant food is unevenly distributed and many of the pieces from the stem end are worthless. For these reasons much care is taken to keep potatoes so they will not sprout till planting time.

Cultivation of Potatoes.

The clover and timothy meadow is plowed late in the fall and left till spring without harrowing. This late plowing exposes to the winter frosts many insects that might injure the potatoes. Leaving the ground unharrowed gives it a better chance to catch snow, and it also pulverizes better in the spring. The ground is disked before planting. The potatoes, after being cut to one or two eyes, are planted with a potato planter, 13 inches apart in the row and in rows 38 inches apart. This requires 10 to 12 bushels per acre.

Cultivation commences after the next rain. A four-shoveled cultivator is used, running very deep. Before the potatoes are up the ground is well harrowed, and as soon as they are up the cultivator is again used. The shovels are set to throw the dirt in and run deep, thus burying all the little plants. When the potatoes come through again the spring-toothed weeder is used both ways, leveling the ground nicely. The soil now has been stirred nearly as deep as plowed, is well pulverized, and is in excellent shape for root growth, to absorb water, and to withstand drought. It is perfectly free from weeds, for none can endure such treatment. From this time on the cultivator and the weeder are used alternately, the cultivator in these later cultivations having six 2½-inch shovels and running shallow so as not to disturb roots. The weeder is used until the plants are 10 or 12 inches high. The weeder is usually run crosswise and then lengthwise of the rows soon after each cultivation with the cultivator.

Potato Beetles.

As soon as any striped beetles, commonly called Colorado potato bugs, appear, boys are hired to gather them by the hundred. The price varies with the plentifulness of the insects, but is always high enough for the boys to make good wages, which are usually about 5 cents a hundred "bugs." The owner does not pretend to count the insects, but measures them in a can cover that holds 200. This is the cheapest and most effective way he has found for keeping the beetles in check. As this work is commenced early, very few young beetles are hatched. In 1905, 30,000 "bugs" were gathered from 14 acres at a cost of $15. In 1906, 35,000 were gathered from the same field. Sprays have never been used, but would doubtless prove profitable, as some damage is done by fungous diseases.

Digging Potatoes.

The digging gang consists of 1 man and 4 horses with the digger, 2 teams and wagons, 4 men to pick up, and 2 men to sort and store in the cave. This force puts in 600 bushels a day at a cost of 2½ cents a bushel, not counting the men and teams on the digger.

Yield of Potatoes.

Two hundred bushels of potatoes to the acre are considered a good crop, but 360 bushels have been produced. The yields are practically double the average of this part of the State. The increase is due to the high quality of seed, the thorough cultivation practiced, and the rotation and manure used.

Cost of Producing Potatoes.

The estimated cost of producing an acre of potatoes and putting them in the cave is—

Plowing and harrowing	$1.50
Disking	.40
Seed, 12 bushels at 55 cents	6.60
Cutting and planting	1.50
Cultivating	4.00
"Bugging"	1.25
Gathering 200 bushels	6.50
Total	21.75

At these figures 1 bushel when stored in the cave has cost 10.88 cents, without counting rent of land or use of machinery.

GRASS.

Nine pounds of timothy, 12 pounds of red clover, and 2 to 3 pounds of alsike clover are sown to the acre, without any other crop, on ground that has grown potatoes two or three years. This is very different from the common practice, which is to sow 8 to 10 pounds of timothy and 5 to 7 pounds of clover to the acre with a full crop of wheat or oats. It will be seen that Mr. Beadle sows the usual quantity of timothy and more than double that of clover. He considers heavy seeding and the full use of the land both essential to good grass crops. The weeds are clipped once or twice, if necessary, but a hay crop is secured in the fall.

A hay crop the first year is almost an unheard-of thing in this region. This man is able to produce it because of the good condition of his land and the fact that the grass has the full use of the soil. A large proportion of the grass sown with grain fails to make a stand, but a failure has never occurred on this farm. The second year two crops of hay are cut, and then there is usually a good after-

math to plow under or, if the grass is to stand another year, to leave for winter cover. No stock is ever allowed on the meadow. This is another important point. As a result of these practices the yields secured are more than twice those common in the neighborhood. In 1906, 52 loads, conservatively estimated at 1,500 pounds each, were produced on 7 acres, making a yield of over 5½ tons an acre for the season. The first crop in 1907 was 22 tons from the same field.

Hay is raked quite green and cured in the windrow and cock. As soon as sufficiently dry it is hauled to the barn. No salt or lime is ever used on the hay. A side-delivery rake has recently been purchased with the intention of using a loader on the windrows so as to save cocking and pitching.

PASTURE.

The pasture is permanent and consists of 11 acres of Kentucky bluegrass, timothy, and white clover. Throughout the season of 1906 it furnished plenty of feed for 5 cows and 5 calves, 3 yearling heifers, 1 horse, and the team when not in use. In July, 1907, there were 6 cows, 2 yearling heifers, 2 horses, 1 colt, and the team when not in use on this pasture, and still several tons of hay might well have been cut. In this locality tame pastures usually require 1½ to 2 acres for each head of stock, but it will be seen that this pasture is supporting about a head per acre besides the calves and colt, and there is feed to spare. The difference is due entirely to difference in care. Here manure is frequently applied, and weeds, such as thistles, dock, and ironweed, are either cut off or dug out. In this way a dense, luxuriant growth of grass is secured.

FRUIT.

While fruit growing is of minor interest on this farm, it adds considerably to the net income. Especially is this true of the half acre of strawberries, which returned $260 in 1907, and the quarter acre of blackberries, from which 375 quarts had been sold up to August 7, with one-third of the crop still on the bushes. Vegetables are rarely sold. These products are nearly all retailed at a good price, and special effort is made to deliver them in first-class condition.

MANURE.

Both meadow and pasture receive a heavy dressing of manure in the winter. No manure is used directly on the potatoes and no commercial fertilizer has ever been used. What is made in the summer is hauled directly to the pasture. During the winter the cattle yard, as well as the barn, is kept well bedded with wheat straw, so that as much manure as possible will be made. The straw is secured from the neighbors for almost nothing. What manure is needed is hauled from a near-by town, where it is to be had free of charge.

HORSES.

An old team and 1 young mare, 1 two-year-old colt, and 1 spring colt are now on the farm. The mare is a high-grade Percheron and the colts are always from the best available sire of that breed. They are fed but little grain during the winter and none in the summer. The work horses are never grained heavily and are pastured when not in use in the summer.

CATTLE.

All the cattle, except 1 milk cow which is kept for family use, are registered Shorthorns of good quality. The calves, of course, are allowed to run with the cows. A little corn is fed during the winter, but none in the summer. The cattle business is not yet well established, and unfortunately the young stock has not thus far sold at as good prices as the owner could justly expect. The herd now contains 6 cows, 2 yearling heifers, and 1 bull, and 6 calves are expected this season.

POULTRY.

About 50 Barred Plymouth Rock hens are kept primarily for family use, but most of the cockerels are easily sold at $1.50 each for breeding purposes; also a few eggs for setting. The flock is kept confined during the summer.

EQUIPMENT OF FARM IN 1907.

Stock.	Value.	Machinery.	Cost.
2 horses	$200.00	1 potato planter	$52.00
1 horse	200.00	1 potato digger	67.00
1 colt (2 years)	125.00	1 walking weeder, 12-foot	15.00
1 colt	50.00	1 plow, 14-inch	14.00
3 cows	300.00	1 harrow, 2-section	10.00
3 heifers, 2 years	225.00	1 wagon, secondhand 17 years ago	35.00
2 heifers, 1 year	80.00	1 delivery wagon, mostly homemade	[a]20.00
1 bull calf	50.00	1 road wagon	[a]40.00
50 hens	50.00	1 mower, 5-foot	45.00
		1 dump hayrake, 10-foot, secondhand	7.00
		1 side hayrake, secondhand	28.00
		1 manure spreader	110.00
		1 walking lister, secondhand	[a]3.00
		1 plow, 1-shovel	1.50
		2 small platform scales	16.00
		1 cultivator, 14-tooth, 1-horse	3.50
		1 cultivator, 4-shovel, with 6-shovel spring shank attachment	17.00
Total	1,280.00	Total	484.00

[a] Estimates.

SALES, EXPENSES, AND NET INCOME OF FARM IN 1906.

Sales.	Value.	Expenses.	Cost.
3½ tons hay	$25.00	1 cow	$50.00
Potatoes, 2,000 bushels, at 60 cents	1,200.00	257 bushels corn	94.45
4 cows	185.00	16 bushels wheat for poultry	8.60
1 calf	15.00	Oil, meal, and bran	10.00
4½ bulls[a]	257.50	Labor	68.00
1 colt	70.00	Seed potatoes	[b] 90.00
Poultry	[b] 100.00	Pasture	[b] 15.00
Eggs	[b] 30.00	Miscellaneous	[b] 75.00
Strawberries	60.00	Taxes	[b] 25.00
Total	1,942.50	Total	436.05

[a] This item includes a half interest in 1 bull. [b] Estimates.

Summary:

Value of farm, 40 acres at $200	$8,000.00
Value of live stock	1,280.00
Value of machinery and implements	484.00
Total	9,764.00
Sales	1,942.50
Expenses	436.05
Net income of farm	1,506.45

RETURNS ON INVESTMENT.

It will be seen that the net income derived is 15.4 per cent on $9,764, the total value of the farm, stock, and equipment. While more cattle were disposed of in 1906 than can be sold every year they did not bring more money than it is hoped the smaller number will bring when the herd is better established. In 1907 much more was realized from small fruit, but the acreage of potatoes was reduced one-half.

The sales usually amount to about $1,500 per annum, which, after paying expenses, leaves about $1,100 (or 11¼ per cent on the capital invested) and the produce used, which represents the income of the family or the amount available for living expenses and profits. That the family has been able to live on less than this is shown by the fact that the farm has been paid for practically in eleven years, improvements costing about $1,000 have been added, and the value of the live stock has been considerably increased. The place was purchased at $92.50 an acre, and is now worth about $200 an acre.

Considering the farm at its present value, the average net profit has been approximately $800 per annum. Without considering the rise in value of the land, but counting only the purchase price of the farm, the cost of improvements made, and the increased value of the stock, the net profits actually resulting from what has been produced have been not far from $500 per annum.

In comparing these results with those obtained in other lines of business or by men working for salaries, it must be remembered that all living expenses of the family were paid out of the receipts from the farm and that these profits still remained. The home alone is worth a large proportion of the value of the entire farm, yet this has been included in the investment upon which the percentage of profit has been figured.

All of the produce, poultry, eggs, butter, milk, and some fuel have also been supplied by the farm. These are items which no one would think of including in the business expenses of any other line of work. To rent as good a house and live as well as this family does would require $1,500 a year in almost any city. And to do this and save as much as this farmer has netted would require a salary of about $2,300.

The owner of this farm had previously operated 160 acres for a number of years, but has done so much better on 40 acres that he has no desire for a larger area. He alone does practically all the work of the farm, none of the other three members of the family assisting in the outdoor work.

SUGGESTIONS AS TO IMPROVED METHODS.

Under the present practice one mare does nothing but raise a colt, while the old team is probably not in use more than half the time. The work could easily be done by a team of brood mares. Two colts a year could be raised instead of one, and the expense of keeping an extra horse would be avoided.

The cropping system now in use is very irregular. Two years there are 7 acres of potatoes and the third year 14 acres. Three consecutive crops of potatoes on the same land are not advisable on account of danger from disease, but even if grown for three years the system would still be just as irregular. One year there would be 7 acres of old grass and two years there would be 7 acres of old grass and 7 acres of new seeding. This makes the hay supply irregular. The hay ration, too, can be much improved by the introduction of alfalfa. To correct these difficulties the following changes are suggested: Lay out the fields as shown in figure 2. This will not require any change in fences, as no fences are needed between fields. It will eliminate the sweet corn fodder, but will supply alfalfa, which is more productive and a more valuable feed. A large proportion of the alfalfa will be near to the pasture and can conveniently be cut and thrown over to the stock if necessary. There will be 3¼ acres of alfalfa, 4¾ acres of old grass, 4¾ acres of new grass, and 9½ acres of potatoes each year, with a regular rotation of two years in grass and two years in potatoes. Assuming yields of 200 bushels of potatoes, 6 tons of alfalfa, 4 tons of old grass, and 1¼ tons of new grass to the acre, the proposed

plan gives 1,900 bushels of potatoes, 25 tons of timothy and clover hay, and 19½ tons of alfalfa, while the present plan gives an average of 1,833 bushels of potatoes, 34 tons of hay, and 6 tons of fodder.

By the change 67 bushels of potatoes and 4½ tons of feed are gained, a much better quality of feed is obtained, and a regular rotation, giving the same acreage in each crop each year, is adopted. The feed supply will therefore be more regular, as there will not be so much danger of a shortage or surplus of hay.

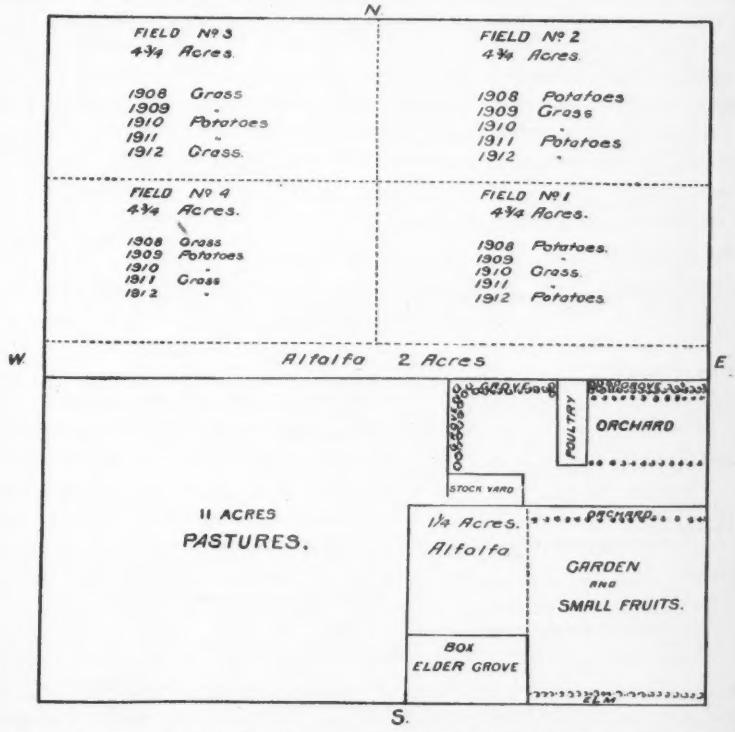

FIG. 2.—Diagram of the Beadle farm showing suggested improvements in arrangement.

Assuming the above yields, 2 horses, 2 two-year old colts, 2 yearling colts, 2 spring colts, 5 cows, 1 bull, 2 yearling heifers, and 4 calves can be kept, and about the same quantity of corn as now used will be needed. The pasture will usually summer this number of stock or at least has furnished feed enough for the last two years. In case of a scarcity of grass, stock could be pastured out at reasonable prices, or the pasture could be supplemented with alfalfa, and a little hay purchased in winter, if necessary. Some patches in the garden that

will be vacant by the middle of the summer can be utilized for catch crops of feed.

The introduction of alfalfa will considerably improve the feed ration for both cattle and horses, as will be seen by examining the appended table, which shows the food requirements of cattle of different ages according to the Wolff-Lehmann feeding standards, approximately the ration now used, and the proposed ration. The hay is assumed to be an even mixture of timothy and clover. If it should be three-fourths clover and one-fourth timothy, the protein content would be increased by one-fifth and the carbohydrates decreased by one-twentieth.

TABLE I.—*Daily food requirements of cattle of different ages, the quantity now used on the Beadle farm, and the ration proposed.*

Feed.	Dry matter.	Protein.	Carbohydrates.	Fats.
CALVES (600 POUNDS WEIGHT).				
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
Quantity required	15.00	1.50	7.9	0.4
Present ration:				
Hay (one-half clover, one-half timothy)—14 pounds	12.11	0.67	5.50	0.22
Corn—4 pounds	3.50	.31	2.67	.17
	15.61	.98	8.17	.39
Proposed ration:				
Hay (one-half clover, one-half timothy)—5 pounds	4.29	0.24	1.98	0.08
Alfalfa—8 pounds	7.30	.88	3.16	.10
Corn—4½ pounds	3.50	.35	3.00	.20
	15.09	1.47	8.14	.38
YEARLINGS (900 POUNDS WEIGHT).				
Quantity required	21.60	1.60	10.80	0.36
Present ration:				
Hay (one-half clover, one-half timothy)—21 pounds	18.90	1.10	8.71	0.33
Corn—3 pounds	2.60	.20	2.00	.12
	21.50	1.30	10.71	.45
Proposed ration:				
Hay (one-half clover, one-half timothy)—10 pounds	8.58	0.48	3.96	0.16
Alfalfa—10 pounds	9.16	1.10	3.96	.12
Corn—4 pounds	3.50	.31	2.67	.15
	21.24	1.89	10.59	.43
COWS (1,200 POUNDS WEIGHT).				
Same basis as cattle eighteen to twenty-four months.				
Quantity required	28.80	2.16	14.40	0.48
Proposed ration:				
Hay (one-half clover, one-half timothy)—20 pounds	17.10	0.96	7.92	0.31
Alfalfa—11 pounds	10.00	1.21	4.35	.13
Corn—3 pounds	2.60	.20	2.00	.13
	29.70	2.37	14.27	.57

To feed the bull all the year and the other cattle six months these rations will require 32,400 pounds of mixed hay and 23,100 pounds of alfalfa. This will leave 17,600 pounds of mixed hay and 15,800 pounds of alfalfa for the horses, which will feed the team nine

months and the colts six months. If the cattle were grade stock it would probably be more profitable to feed no grain except, perhaps, to the calves, and even in this herd it may be found economical to feed less grain. When stock is to be prepared for show these rations would be inadequate.

A FORTY-ACRE FARM IN ADAMS COUNTY, NEBRASKA.

INTRODUCTION.

In December, 1895, Mr. H. F. Warren purchased 40 acres of unimproved rough land 10 miles from Hastings, south-central Nebraska. The price was $400 and a mortgage was given for the whole amount. He secured also a lease on 40 acres of tillable land for two years, giving one-third of the crop, and a lease on a house and outbuildings for two years. January 1, 1896, his business statement showed:

Resources	$942.85
Liabilities	648.80
Present worth	294.05

The lease on the buildings was valued at $100. The inventory was detailed and included everything in doors and out.

THE LAND.

The land purchased is cut by several deep draws and is one of the roughest pieces in the county. Most of it was in native grass, one-third is untillable, and the remainder is cut up into small patches by several deep ravines. Two acres were in public roads. There was no timber. The soil is of loessial origin and is mostly the dark silt loam so common in the Missouri basin. On many of the hillsides the dark soil has been washed off and the buff subsoil lies bare. Near the largest draws are some patches of fine sandy loam.

THE OWNER AND HIS PROSPECTS.

No one but the owner believed it possible to make even the most meager living upon such a farm—38 acres of rough pasture 10 miles from town, no buildings, no money, four mouths to feed, two hands to earn. The neighbors thought him foolish to try. It was certainly a hard-looking proposition, but the personal factors at least were in his favor. He was young and strong and possessed energy and determination. Both he and his wife knew how to make the most of everything. He was an experienced farmer and also knew something of garden and nursery work. He was handy with tools and could do practically all of his own smith, carpentry, and mason work. The figures on page 20, taken from the annual balance sheets, show what success has been attained.

MANAGEMENT.

The rented land was planted to corn, and as there was very little stock most of the crop had to be sold, but the price (8 to 15 cents a bushel) was too low to pay the cost of production. From 1898 to 1906, inclusive, no land was rented. Work was at once commenced on the home place. The tillable land was subdued. Orchards were set and the bottoms of the draws, which were too frequently overflowed to produce crops, were set with forest trees.

POTATOES.

Several patches were recognized as good potato soil and in 1898 potatoes became the main crop and continued so for at least five years. One year the cash sales of potatoes amounted to $450. Early marketing was resorted to as much as possible, and potatoes were frequently hauled 14 miles and seldom less than 10. Sale was often slow and continued till spring. Catch crops of sorghum, millet, or turnips frequently followed early potatoes. There was so little tillable land outside the orchards that rotation was not undertaken, and the continued growth of potatoes so filled the ground with disease that the crop had to be abandoned.

MISCELLANEOUS CROPS.

Not much truck has been grown because it is too far to market. Different years various small crops that were not regularly produced have been planted successfully. One year several acres of sorghum made a profitable crop of both seed and sirup. White beans were once an important item of income. Another year a catch crop of turnips after potatoes proved very profitable and the next season considerable turnip seed was sold.

ORCHARDS.

The orchards, of which there were 12 or 15 acres of apples, peaches, cherries, and plums, were ruined by severe storms and became a total loss. Most of the trees have been grubbed out or cut down. The labor and money spent upon them constituted a heavy loss to the owner.

TIMBER.

The forest trees have proved a great success and for several years have supplied an abundance of fuel. Unfortunately, most of the earlier settings were of maple and ash, which, though valuable for fuel, are worthless for posts. Later catalpas were set and promise soon to furnish all the posts needed and some to sell.

It should be emphasized that all these forest trees producing valuable timber are on land that would otherwise have been entirely waste. Many a farm in this region has enough such waste land to produce all the fuel and posts that can be used. If the proper varieties are set no better posts or wood can be had at any price. The importance of this will be seen when it is remembered that common small posts are worth 16 to 25 cents each and soft (bituminous) coal about $8 a ton.

STOCK.

In 1896 a herd of pure-bred hogs was started, but after several years was given up as a failure and for some time no hogs were kept. But since potatoes were abandoned most of the available land has been seeded to timothy, bluegrass, and alfalfa for hog pasture, and hogs for market have been the chief product of the farm in recent years. About 170 pigs were raised last year. All the grain is purchased. The pigs are farrowed in a large pig house, and as soon as conditions permit all sows and pigs are turned out together in the pastures. While the hogs are on pasture only a light feed of grain is given.

Concerning the character of the pasture it may be stated that part of it is rough land not suited to the plow and is in native prairie grass. A small portion of the pasture land is in bluegrass, another small portion in timothy, while several acres are in alfalfa. Sometimes the orchard is utilized as pasture for hogs. During the winter alfalfa hay and corn are fed.

The best old sows are kept over to bring fall pigs. The pigs are marketed at from 9 to 12 months of age. Mr. Warren is gradually bringing all available land on his farm into pasture and forage crops for hogs.

Two horses and 1 to 3 cows have always been kept. A good flock of hens—sometimes over 200—has added considerably to the income, as well as supplying the table with poultry and eggs.

LABOR.

Only a few days' work has ever been hired. Work is exchanged with the neighbors and sometimes grain has been taken in payment for work. Nearly every year a little money has been received for labor. This year (1907) the children are helping a good deal.

EXPENSES.

During the six years, 1896 to 1901, inclusive, the average annual cash expense for living, including clothing, furniture, fuel, groceries, doctor's bills, and every expense connected with the household, was

only $66.44. Everything else used was either produced on the farm or secured in exchange for produce. At the beginning of this period there were four persons in the family and at the end seven.

For the eight years ending in 1903 the average annual farm expense, exclusive of permanent improvements, stock, and feed, but including machinery, repairs, and incidentals, was $35.23.

These items show how nearly a family may live upon the produce of the farm and how low an ingenious man may keep the incidental expenses of the farm.

RESULTS ACCOMPLISHED.

From 1896 to 1903 a business statement was made out each year, and the following table shows the financial condition on January 1 of each year:

TABLE II.—*Business statements for the Warren farm from 1896 to 1903, inclusive.*

Year.	Real estate.	Lease.	Cash.	Machinery.	Live stock.	Feed and supplies.	Household goods.	Total resources.	Total liabilities.	Present worth.	Net gain or loss.
1896	$400.00	$100.00	$92.85	$113.00	$96.00	$31.00	$110.00	$942.85	$648.05	$294.80	-------
1897	400.00	50.00	6.90	70.00	165.00	82.25	110.00	849.15	577.00	272.15	−$22.65
1898	550.00	-------	69.48	82.00	402.00	2.95	75.00	1,473.48	613.78	859.70	+587.55
1899	700.00	-------	1.67	57.00	235.00	63.00	75.00	1,131.67	555.70	575.97	−283.73
1900	1,000.00	-------	.02	89.00	220.00	179.00	75.00	1,563.02	450.90	1,112.12	+536.15
1901	1,000.00	-------	.00	79.00	205.00	138.00	75.00	1,497.00	[a]10.00	1,487.00	+374.88
1902	1,200.00	-------	.00	105.00	115.00	145.00	80.00	1,645.00	[a]10.00	1,635.00	+148.00
1903	1,350.00	-------	6.53	95.00	147.00	156.00	80.00	1,834.53	[a]10.00	1,824.53	+189.53

[a] Taxes, estimated.

In the autumn of 1906 land was rented and teams and machinery purchased to operate it, because two of the boys are now large enough to help. Had it not been for this expansion, the hogs sold near the close of 1906 would have paid all debts and the running expenses through the next summer. There were also on hand—

Cash	$65.00	Household goods	[a] $30.00
2 horses	150.00	Machinery and tools	90.00
3 cows	90.00	Feed and supplies	302.00
11 hogs	200.00	Farm	[b] 3,000.00
78 fall pigs	273.00		
Poultry	12.00	Total	4,212.00

[a] Possibly this is as much as these goods would have brought on the market. This includes a collection of mounted animals and birds which it is not probable that any taxidermist would sell for less than $200, and it is worth much more than it was in 1896 when the owner invoiced it at $40. The writer would estimate the household goods exclusive of the specimens at $150.

[b] The farm was not for sale and could not have been purchased at this price.

The buildings and fences cost probably $1,400 for material alone. The increase of $2,600 in the value of the farm since it was purchased would probably not pay the cost of the improvements that have been made if orchards and groves are included. The owner of this farm has worked hard and the family has lived economically, but most of the time many of the comforts of life, as well as the necessities, have been enjoyed and the children have been kept in school. There has always been time to care for the hundreds of flowering perennials and shrubs and ornamental trees which almost hide the house from view. To start with $294 capital and in eleven years have over $4,200 and care for two to seven children all the time is certainly a very good showing for 38 acres of rough land. Two acres of the 40 are in public roads. No land was rented until 1907, except the first two years, and that did not pay expenses.

A TWENTY-ACRE FARM IN PAWNEE COUNTY, NEBRASKA.

INTRODUCTION.

Ten years ago Mr. Arnold Martin, a young Swiss farmer, who as a result of three years' renting in northeastern Kansas had secured a team, a little farm machinery, and $275 in money, became dissatisfied. He had been raised on a 6-acre farm, had studied agriculture in the public schools, and knew something of intensive methods. He believed he could do better on a small place of his own than on a large rented farm. In Pawnee County he found 20 acres of unimproved rough land mostly covered with brush and small trees. Good land was worth $50 to $70 per acre, but no one seemed to want this piece. He purchased it for $12.50 per acre, paying $100 down and giving a note for $150 at 7 per cent interest for three years. There remained $175 with which to make improvements and start his work. Realizing that it would take several years to subdue most of his own land, he leased an adjoining piece of about 4 acres for five years. This was also unbroken and needed considerable clearing.

While grubbing, plowing, and planting, the owner was studying the markets and his soil to see what he could produce for which there was a home demand. Potatoes, onions, small fruits, pears, and peaches were chosen for the main crops, with corn for any land not otherwise occupied.

THE SOIL AND ITS USE.

A small field of nearly 2 acres of alluvial soil is kept for annual crops. The slopes are rocky in places and the soil is a residual clay loam, having been formed mostly by the weathering of the lime-

stone which underlies it. About 8 acres of this are set to orchards, about 1 acre in alfalfa, 1 in timothy and clover, 3 in pasture (half of which is timbered), and a little in annual crops. One hill is poor soil, largely formed by glacial deposits, and contains some bowlders, locally called "nigger heads." About 2 acres of this is in wild grass, which is used for hay, as is also about half an acre of stony land around the quarry. There is still a little land that has not been put to use.

METHODS AND PRACTICES.

The intensive methods practiced are of particular interest. The land is kept busy from spring till fall. At the last cultivation of the potatoes corn is planted between the rows. A full crop of potatoes is secured and a fair crop of corn also. As many as 75 bushels of corn to the acre have been grown in this way. The corn usually has to be hoed once, but the potato vines nearly cover the ground, so not much working of the corn is required. After the potatoes ripen the corn keeps the weeds down. By the time the corn needs the ground the potatoes are ripe, and the corn is in the shock before it is time to dig the potatoes. Squashes are sometimes planted the same way. Usually parts of the potato patches are sown with millet or sorghum just before the last cultivation. This makes a good crop of feed and does not hurt the potatoes. The smallest yield of potatoes ever secured was 100 bushels an acre and the largest over 700 bushels an acre. The onion patches grow corn and melons, which are planted in the rows between the onions. Part of the orchard is set with small fruit and part is planted with potatoes and truck.

In dry spells all the water the windmill will pump is used for irrigation, and it is here that intensive cropping reaches its height. There is also a small irregular spring which flows into a reservoir and at times furnishes considerable water. The water from the well flows directly to the ditch as pumped. A little manure is scattered in the ditches to prevent washing.

The accompanying diagram (fig. 3) shows the rows of crops in two of the spaces between rows of pear trees. The pears have been set six years and the limbs touch in the rows, yet nearly all the other plants were doing well when the writer visited the farm late in June. The trees are 10 feet apart in the rows and the rows 12 feet apart.

MANURE.

On account of the soil being new, not so much manure has been required as will be needed in the future. All that is made on the farm is used and all that is wanted can be obtained two miles distant. All cornstalks and coarse waste are used to prevent washing or to

mulch trees or berries that can not be cultivated. About two loads of wood ashes are secured annually and used on strawberries and pear trees.

FRUIT.

The orchards contain 900 pear, 200 cherry, about 800 peach, and a few apple trees; 200 plums were set, but have been grubbed out because they were not profitable.

Pears have paid the best. Many varieties have been tried. Some varieties are not readily self-fertilized, especially the Kiefer, so it was necessary to find varieties that flowered at the same time, as well as those that were hardy and prolific. The best success has been attained by planting Dwarf Duchess and Standard Kiefer alternately. Standard Flemish Beauty has also done well.

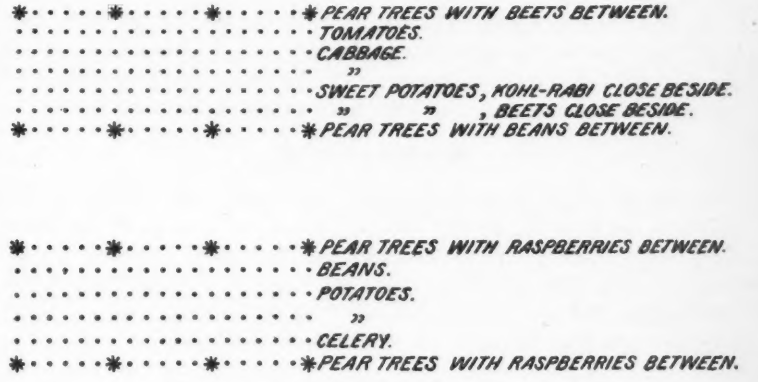

FIG. 3.—Rows of crops in the pear orchard on the Martin farm.

Of the small fruits strawberries have given the best returns, but a good many raspberries and blackberries have been grown, and some gooseberries and currants.

SEED CORN.

The production of corn for seed and for exhibition has been undertaken as a side issue and is proving very successful. Mr. Martin won a gold medal on corn at the St. Louis Exposition. At other fairs many premiums have been awarded his products. He finds ready sale for seed corn at good prices. When corn is grown without any other crop cultivation is continued until the ears are well matured. Contrary to the practice of most breeders, Mr. Martin plants the best ear in a patch by itself, and the best ear from the crop is selected and planted in the same manner. The prizes he has won do not make a bad showing for his practice.

EXHIBITS OF FARM PRODUCTS.

The last few years considerable attention has been given to growing a large variety of products for exhibition purposes. Last year $243.25 in cash prizes was secured. At the Portland Exposition three gold and two silver medals were won.

SPRAYS.

Mr. Martin is an enthusiastic advocate of dust sprays and uses sal Bordeaux mixture frequently on orchards and truck. Arsenical poisons are used as insecticides. His plants and trees have a very healthy appearance and the pear orchard is probably the best in the State, but it must be remembered that the trees are still young.

LABOR.

No labor is ever hired. The owner, with the help of his wife, does it all, and besides has earned considerable money every year, except the last, by helping his neighbors. He has more work now than he can well do at home and may soon have to hire help.

MISCELLANEOUS.

No butter, eggs, or poultry have ever been sold. Only a few chickens are kept for family use, and these, on account of the crops they might destroy, are closely confined during the growing season. Only one cow is kept. When there is a surplus of rough feed, calves are bought, fed through the winter, and sold in the spring. Some hogs are now kept to make use of unsalable products.

EQUIPMENT.

Stock.	Machinery.
1 team of mules.	1 wagon.
1 cow.	1 mower.
1 1-year-old driving colt.	1 hayrake.
1 sow.	1 cultivator, 4-shovel, 2-horse.
A few chickens.	1 cultivator, 5-shovel, 1-horse.
	1 harrow, 2-section.
	1 walking lister.
	1 walking plow.
	1 hand cultivator.
	1 garden drill.
	1 hand sprayer.

INCOME AND EXPENSES.

The following shows the receipts for produce sold from the farm for the past ten years. Exact accounts of everything have been kept. To this should be added about $100 received for rock quarried on the farm by the owner's labor. The profit on the calves which have been wintered should also be added, but the amount is unknown:

1897.

3 acres potatoes, 678 bushels at 50 cents	$339.00
8 acres corn, 220 bushels at 32 cents	70.40
One-half acre vegetables	72.00
Received for helping neighbors	58.00
Total	539.40

1898.

5 acres potatoes, 930 bushels at 45 cents to $1	$418.50
12 acres corn, 170 bushels	53.20
Strawberries and vegetables	126.30
Received for helping neighbors	103.00
Total	701.00

1899.

7 acres potatoes, 1,085 bushels at 35 cents	$379.75
12 acres corn, 230 bushels at 30 cents	69.00
One-half acre small fruit and vegetables	136.40
Received for helping neighbors	46.20
Total	631.35

1900.

10 acres potatoes, 1,260 bushels at 40 cents	$504.00
12 acres corn, 220 bushels at 32 cents	70.40
One-half acre vegetables	82.60
One-half acre small fruit, 126 crates at $1.60	201.60
Received for helping neighbors	36.40
Total	895.00

If too many acres appear to be accounted for, it must be remembered that much of the land raises two crops.

1901.

5 acres potatoes, 710 bushels at $1 to $2	$810.00
8 acres corn (none sold).	
Small fruit and vegetables	69.50
Received for helping neighbors	28.00
Total	907.50

This was a very dry season and the thorough cultivation practiced told well on the potato crop.

1902.

5 acres potatoes, 1,600 bushels at 25 cents	$400.00
10 acres corn, 280 bushels at 35 cents	98.00
Small fruit	325.40
Received for helping neighbors	42.00
Total	865.40

1903.

Potatoes, at 80 cents to $1.50	$412.00
Received for work at college	175.00
Total	587.00

In 1903 half the land was rented and the owner spent three months away from home starting a farm for a college. This made the receipts for the year very low.

1904.

5 acres potatoes, 8 acres corn, etc.:	
Potatoes, 750 bushels at 75 cents	$562.50
Corn, 210 bushels at 40 cents	84.00
Small fruit and vegetables	146.50
Received for helping neighbors	56.25
Total	849.25

1905.

6 acres potatoes, 7 acres corn, etc.:	
Potatoes, 892 bushels at 60 cents	$535.20
Corn, 168 bushels at 40 cents	67.20
Seed corn, 46 bushels at $1.50	69.00
Small fruit and vegetables	126.50
Received for helping neighbors	76.80
Total	874.70

1906.

4 acres potatoes, 8 acres corn, etc.:	
Potatoes, 350 bushels at 55 cents	$192.50
Corn, 120 bushels at 36 cents	43.20
Pears, 286 bushels at $1.20	343.20
Seed corn, 38 bushels at $1.75	66.50
Premiums	243.25
Hogs	142.50
Total	1,031.15

RESULTS ACCOMPLISHED.

The results accomplished, as shown in the foregoing statements, have not been obtained by catering to fancy city trade. The nearest market of any consequence and the one where most of the produce has been sold is a town of 2,500 inhabitants 7 miles distant.

In 1899 the mortgage of $150 was paid; in 1902 a barn was built at a cost of $100; in 1903 a well, a windmill, etc., were built costing $100, and an addition to the house, costing $200, was made. The fencing used cost about $50.

The home is now comfortably furnished and practically all has been paid for in ten years. The other expenses of the farm have been very light except for nursery stock, which has probably cost $800. The house is a neat little four-room cottage. The barn has a stone basement, 16 feet by 20 feet, for stock and an upper story for grain and hay.

Mr. Martin now owes no one and has some money ahead. The farm could easily be sold for $2,500. The owner has made three pleasure trips to Colorado and spent three months last winter in Switzerland. He has found time also to gain a good command of English, both spoken and written.

Mr. Martin says his place is far from producing what it is capable of; in fact, there are several acres that have as yet produced almost nothing. He expects to do much better in the future. It will readily be seen that much time and money have been spent on orchards which have only just commenced to bear.

The neighbors used to laugh at the young foreigner and nicknamed him "Hazelbrush," but now they say, "He is making more money on 20 acres than we do on 160." He does not want any more land, but wants to farm what he has better. In speaking of the size of farms he once said: "People of moderate means should not farm too much land. A man can start on 20 acres; 40 acres will do; 80 is enough; 160 an abundance; 320 a misfortune; and 640 a calamity."

GENERAL CONCLUSIONS.

Nothing in this bulletin should be interpreted to mean that the time has come when the average farm in the corn belt should be reduced to 20 or 40 acres. We do not mean any such thing. It seems perfectly clear that the majority of farms should contain 80 to 160 acres. There is no reason why the man who owns a large farm and has means and help to operate it should reduce his acreage. But the man who must depend mainly on borrowed money or is unable to secure sufficient help often overreaches and reduces his profits or creates an actual loss in consequence, when if he had been content to work on a smaller scale, depending mostly upon his own

labor and as little as possible upon borrowed funds, success would have been much more certain.

Even the man on a 160-acre farm must depend largely upon making a profit from hired labor. His margin usually is not large and his risk is considerable. He must commonly be content with a very moderate return upon his investment. There are many details which must too often be entrusted to incompetent or indifferent persons, and many small losses and leaks occur that could be prevented if the owner had less to look after. The small farmer can not expect to clear as much as the larger one in the most favorable seasons, but on the other hand his loss will be much less in unfavorable seasons. He has less risk not only because he has less invested in land, but especially because he has less invested in teams, machinery, feed, etc., and has entirely eliminated the very important item of expense for hired help, and also because he can keep closer watch of everything and in case of sudden or unforeseen contingencies, such as sudden storms, can care for his smaller acreage more quickly. Generally, too, his income will be more evenly divided between several products than is that of the larger farmer, and consequently his chances of heavy loss are very much reduced. In case of poor crops the small farmer can lose little besides his living expenses because his running expense is very small, but the large farmer who operates on borrowed capital has his interest to pay and heavy running expenses, including hired labor. One adverse season may consume the profits of several favorable ones.

The capital invested in a small farm is often of minor importance, the owner's labor being the main producing factor, but on large farms or even on farms of moderate size interest on the investment may be much more than the value of one man's labor. Nearly everything on the small farm returns a larger percentage of profit because everything receives the owner's personal attention. He does all the work and does it much better than hired men can be expected to, and this difference is often enough to make the difference between a loss and a good profit.

Generally the man on less than 80 acres can not afford to grow much grain. As a rule, he should aim to produce things that are shipped into his home town rather than those that are shipped out. A glance at any grocer's stock is sufficient to show that he is obliged to import much that could be profitably grown in the vicinity. Strawberries, blackberries, grapes, melons, cabbage, tomatoes, onions, sweet potatoes, and potatoes are among the products that are annually shipped into many of the towns in this region and during the season when they could be supplied by the neighboring farms. Of the products adapted to small farms for which there is a more general

market, hogs and alfalfa will probably take the lead. Dairying can always be resorted to; the growing of improved seed corn can well be handled on the small farm; 100 or more hens can always be made profitable. No one man will produce all of these, and for that reason there is room for several small farms near every town of even a few hundred inhabitants. Near the larger cities small farmers, truckers, and dairymen are numerous and competition is close, but still there is room for more men with energy and intelligence who are quick to see what can be produced at a good profit.

No small farmer should depend entirely upon any one product unless it be a dairy product. Danger of failure is too great and there is not an economical distribution of labor. There will be too much to do at one season and nothing at another.

A few cows, a few hogs, and a good many hens will work in nicely with almost any combination of crops. If many hogs are kept most of the farm should be in alfalfa, and hay and hogs would be the products sold. Potatoes or seed corn can be handled with hogs and alfalfa. Often a pasture has to be plowed up, and this makes an excellent place for either corn or potatoes. If cream or butter is to be sold, enough hogs should be kept to make profitable use of the milk. The number of types of farming and combinations of crops that can be adopted is very large, and the writer has intended to mention only a few and not to exhaust the list. It will be seen that some of these types are almost independent of local markets.

Every man must make a careful study of the local conditions, his own preferences, and the crops and stock he selects. Of these he should become an expert producer. Every foot of ground should be kept busy as much of the time as possible and to do this catch crops, such as turnips, pumpkins, millet, sorghum, and early varieties of corn planted late for feed, must often be resorted to. Frequently before one crop is off the ground another may be started. The producing power of the soil must be kept at the maximum by the use of manure and leguminous crops.

It is not the intention of the writer to encourage city men who know nothing of farming to go on to farms expecting easy work and large profits. Without economy and hard work success should not be expected on any farm. Experience is as necessary as in any other line of work. The more intensive the methods the more necessary experience becomes. It is true that inexperienced men frequently make successful farmers from the start, but this is also true of any other line of business. It should be emphasized that each of the men whose farms have been described was young, strong, and full of energy; that he was an experienced farmer and already familiar with the locality before starting on his small farm.

FARMERS' BULLETINS.

The following is a list, by number, of the Farmers' Bulletins available for distribution. The bulletins entitled "Experiment Station Work" give in brief the results of experiments performed by the State experiment stations. Titles of other bulletins are self-explanatory. Bulletins in this list will be sent free to any address in the United States on application to a Senator, Representative, or Delegate in Congress, or to the Secretary of Agriculture, Washington, D. C. Numbers omitted have been discontinued, being superseded by later bulletins.

22. The Feeding of Farm Animals. Pp. 40.
24. Hog Cholera and Swine Plague. Pp. 16.
27. Flax for Seed and Fiber. Pp. 16.
28. Weeds and How to Kill Them. Pp. 30.
29. Souring and Other Changes in Milk. Pp. 22.
30. Grape Diseases on the Pacific Coast. Pp. 15.
32. Silos and Silage. Pp. 30.
33. Peach Growing for Market. Pp. 24.
34. Meats: Composition and Cooking. Pp. 31.
35. Potato Culture. Pp. 24.
36. Cotton Seed and Its Products. Pp. 16.
42. Facts About Milk. Pp. 32.
44. Commercial Fertilizers. Pp. 38.
47. Insects Affecting the Cotton Plant. Pp. 32.
48. The Manuring of Cotton: Pp. 16.
51. Standard Varieties of Chickens. Pp. 48.
52. The Sugar Beet. Pp. 48.
54. Some Common Birds. Pp. 48.
55. The Dairy Herd. Pp. 30.
56. Experiment Station Work—I. Pp. 30.
58. The Soy Bean as a Forage Crop. Pp. 24.
59. Bee Keeping. Pp. 48.
60. Methods of Curing Tobacco. Pp. 24.
61. Asparagus Culture. Pp. 40.
62. Marketing Farm Produce. Pp. 31.
63. Care of Milk on the Farm. Pp. 40.
64. Ducks and Geese. Pp. 55.
65. Experiment Station Work—II. Pp. 32.
66. Meadows and Pastures. Pp. 30.
69. Experiment Station Work—III. Pp. 32.
71. Essentials in Beef Production. Pp. 24.
72. Cattle Ranges of the Southwest. Pp. 32.
73. Experiment Station Work—IV. Pp. 32.
74. Milk as Food. Pp. 39.
77. The Liming of Soils. Pp. 24.
78. Experiment Station Work—V. Pp. 32.
79. Experiment Station Work—VI. Pp. 27.
80. The Peach Twig-borer. Pp. 16.
81. Corn Culture in the South. Pp. 24.
82. The Culture of Tobacco. Pp. 22.
83. Tobacco Soils. Pp. 23.
84. Experiment Station Work—VII. Pp. 32.
85. Fish as Food. Pp. 32.
86. Thirty Poisonous Plants. Pp. 32.
87. Experiment Station Work—VIII. Pp. 32.
88. Alkali Lands. Pp. 23.
91. Potato Diseases and Treatment. Pp. 15.
92. Experiment Station Work—IX. Pp. 30.
93. Sugar as Food. Pp. 31.
95. Good Roads for Farmers. Pp. 46.
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